US Serial Number 10/728,145
DKT10292

REMARKS:

REJECTIONS UNDER 35 USC 112 SECOND PARAGRAPH

Claims 2-14 and 16-32, stand rejected under 35 U.S.C. 112, second paragraph. The Office Action states that the term "effective amount" is a relative term which renders the claims indefinite.

The appropriate test to be used to determine if the term is indefinite is if one skilled in the art could determine the specific values for the amount required to be effective **based on the application disclosure** and the prior art. (emphasis added) (see In re Mattison, 509 F.2d 563, 184 USPQ 484, 486 (C.C.P.A. 1975) , see also MPEP 2173.05(d)). In Ex parte Skuballa, 12 USPQ2d 1570 (Bd. Pat. App. & Inter. 1989), the Board held that a pharmaceutical composition claim which recited an "effective amount of a compound of claim 1" without stating the function to be achieved was definite, particularly when read in light of the supporting disclosure which provides guidelines as to the intended utilities and how the uses could be effected. MPEP 2173.05(c)III.

Applicants submit that the specification supports the claim terminology. The present invention provides guidance on how much surfactant to be used to obtain the polymer of the present invention. Paragraph [0035] teaches the amount of di or triblock surfactant used to obtain the polymer of the invention see for example

"[0035]   The amount (based on weight percent) of di block or triblock surfactant is dependant on monomer used. The ratio of diblock or triblock surfactant to monomer is at least 3 to 100...."

In addition, the polymer of the present invention has measurable characteristics, for example k' that are indicative of a molecular association (see paragraph [0076]). The k' value is an element of the claim. A person skilled in the art could using the specification can determine the amount of surfactant to use to obtain the associative polymer with the k' values claimed.

For these reasons Applicants respectfully request reconsideration and withdrawal of this rejection.

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Nonstatutory obviousness–type double patenting:
Claims 2-14 and 16-32 are provisionally rejected on the ground of nonstatutory obviousness–type double over claims 2-5, 7, 9 and 11-33 of co-pending application 10/313,632.

Applicant respectfully requests reconsideration and withdrawal of this rejection. The Office Action states that the co-pending and the instant application are claiming common subject matter.

Applicants respectfully disagree with the office actions conclusion. The claims of the present application do not recite --at least one ionic cationic **and or** anionic polymer segment--. The claims of the present invention **require** a cationic polymer segment. The cationic segment is not optional. An anionic segment is optional in the present application. Therefore the present invention involves either a cationic or an amphoteric polymer (by definition amphoteric has both cationic and anionic monomers) in contrast to the anionic polymer claimed in the co-pending application.

Applicants respectfully request reconsideration and withdrawal of this rejection.

COMMENTS REGARDING THE PRESENT INVENTION:

Applicants note that **not** all the surfactants listed in paragraph [0030] are diblock or triblock surfactants. An element of Applicants' claim is a diblock or triblock surfactant.

Some of the surfactants listed in paragraph [0030] are those that help to ease the handling of the system. Paragraph [0035] discusses the secondary surfactants and ease if handling. Paragraph [0035] lists typical surfactants that are there to ease the handling but are not an element of the claim.

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REJECTIONS UNDER 35 USC 102 and 35 USC 103

Claims 2-14 and 16-32, stand rejected under 35 U.S.C. 102(b)/103(a), as being anticipated by Lissant (3,974,116), Robinson (4,339,371), Honig (5,167,766) O'Connor (5,376,713) or Mallo (6,107,398).

Lissant (3,974,116)

Lissant does not teach or suggest the present invention. The office action points to col. 1, line 45 to column 2, line 23 and claims 9-12 of Lissant. No where in the cited reference are diblock or triblock surfactants taught. The present invention _requires_ a diblock or triblock polymeric surfactant. The surfactants used by Lissant are not diblock or triblock. Diblock and triblock surfactants are described in George Odian, on page 142-144 (copies attached) of his textbook (_Principles of Polymerization, Third Edition_, J. Wiley & Sons, New York, 1991). A triblock surfactant is (A-A-An)-(B-B-B-Bm) - (A-A-Ap). Simply said, there is one big block of "A" attached to one big block of "B" and a second big block of "A". Lissant does not teach or suggest these Diblock and triblock surfactants.

Indeed Lissant teaches that "Any suitable emulsifier can be employed" (see col. 6, line 41. Contrast Lissant to the present invention. Not just any emulsifier can be used in the present invention and still obtain a polymer as claimed. Without a Diblock and triblock surfactant as a component of the reaction mixture the resulting polymer will not meet the specifications of the present invention. The diblock or triblock surfactant is an essential element of the present invention imparting properties that would otherwise not be in the final polymer.

For an obviousness rejection there must be teaching of every element of the claim. Lissant does not teach the diblock or triblock surfactant nor does Lissant teach the K' or G' as claimed.

Applicants respectfully requests that this rejection be withdrawn.

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Robinson et al.: (U.S. 4339371)

Robinson et al. does not teach or suggest the present invention. The office action directs applicants attention to column 3, line 60 to col 4, line 29 and claims 5-6 and 9 of Robinson.   Table 1 of Robinson does not contain the diblock or triblock surfactant of applicants invention. Sorbitan mono-oleate, sorbitan monolaurate and the polymeric surfactant of example 1 (in Robinson) are non diblock or triblock surfactants. The present invention claims a diblock or triblock polymeric surfactant, while the surfactant used by Robinson et. al. in US 4,339,371, having the structure shown in Col. 5, line 47, is a multiblock copolymer not a triblock. The difference between a multiblock and a di or triblock surfactant is described in George Odian, on page 142-144 (copies attached) of his textbook (*Principles of Polymerization, Third Edition*, J. Wiley & Sons, New York, 1991). A triblock surfactant is (A-A-An)-(B-B-B-Bm)- (A-A-Ap). Simply said, there is one big block of "A" attached to one big block of "B" and a second big block of "A". The Surfactant in column 5 line 47 does not meet this definition.

Example 9 of Robinson teaches away from using surfactant "A" the triblock surfactant. The emulsion made with surfactant "A" failed to produce the results.

"Secondary polymeric surfactant A did not work" col 8, line 61-62.
Indeed the results shown in Table VI showed that using the triblock by itself Gelled the emulsion.
Applicants respectfully requests that this rejection be withdrawn.

Honlg et al.: (U.S. 5,167,766)

Honig et al. does not teach or suggest the present invention. The office action points to col. 6, lines 6-54 and column 10, lines 34-68 of Honig. No where in the cited references are diblock or triblock surfactants taught. The present invention requires a diblock or triblock polymeric surfactant. The surfactants used by Honig et al. are not diblock or triblock.

Honig does not teach or suggest diblock or triblock surfactants. Sorbitan trioleate does not fit the description of a di- or tri block surfactant. It can be used in applicants' invention as part of a package that contains a diblock or tri block surfactant. It is the diblock or triblock surfactant that is the essential element.

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For an obviousness rejection there must be teaching of every element of the claim. Honig does not teach the diblock or triblock surfactant nor does Honig teach the K' or G' as claimed. In view of these remarks, Applicants respectfully requests that this rejection be withdrawn.

O'Connor: US 5376713

O'Connor does not teach an <u>associative</u> copolymer having a Huggins constant of 0.75 and a storage modulus of G' of greater than 175 and wherein the associative properties are provided by a diblock or triblock polymeric surfactant.

With respect to O'Connors Col. 11, lines 28-49.

Applicants claim that an effective amount of diblock or triblock surfactant is required. Paragraph [0035] teaches how to uses the surfactant to obtain an effective amount. O'Connor uses less then the effective amount from the teaching in Applicants' specification. O'Connors uses (col. 11, lines 35 -40) about 1:100 triblock surfactant to monomer (1.15 gms triblock surfactant to 115 gm monomer (69 gm acrylamide plus 46 gms of acrylic acid). This is considerable less then the teaching of what an effective amount should be as taught in paragraph [0035].

Example 17 of O'Connor teaches a <u>homo</u>polymer made with a polymeric surfactant. Note that applicants' Invention requires a co-polymer. However comparing the data of example 17, specifically the viscosity of 415 cps and the SI of 2.4% with data of table 1, example 1 with viscosity of 410 cps and SI of 4.0%, Example 2 viscosity of 440 cps and SI of 3.7%, example 13 with viscosity of 330 cps and SI of 2.8% and example 14 with viscosity of 350 cps and SI of 1.5%. Example 18 uses oleic acid-ethylene oxide adduct as the co surfactant with data similar to that of example 17, a viscosity of 378 cps and SI of 4.35. The data of O'Connors does not teach or show any difference between using the polymeric surfactant or using the various co-surfactants listed in table 1.

Applicants' teach a **co-polymer** made with a di-block or triblock surfactant results in co-polymers having claimed k' and G' values (see paragraphs [0026] and [0034].

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The polymeric di-block or triblock surfactant used in the present invention is not interchangeable with the various co-surfactants in contrast to O'Connor. The presence of the polymeric A-B-A surfactant in applicants' invention results in unexpected characteristics (G' value) see paragraph [0026]. Using a <u>non</u> di block or triblock polymeric surfactant does not result in applicants' invention.

Furthermore, nowhere does O'Connor discuss either the Huggins' constant or the storage modulus of its polymers or indicate that any unexpected result occurs depending on the co-surfactant used. The claimed Huggins' constant and Storage modulus indicate a non-linear species and associative properties (see paragraph [0071] and [0076]. This was an unexpected result. No where in O'Connor is there any indication that the polymers produced are other than known linear polymers, see for example, col. 1 lines 11-37, col 2 lines 36–42 and lines 58-60. Accordingly, O'Connor fails to teach the present claims.

O'Connor uses less then the effective amount from the teaching in Applicants' specification, does not show any differences between co surfactants, does not show any unexpected results and. In view of these remarks, Applicants respectfully requests that this rejection be withdrawn.

Mallo et al.: US 6,107,398
Claims 2-14 and 16-32 stand rejected under 35 U.S.C. 102(b)/103(a) as being obvious over Mallo et al. (US 6,107,398).

In analyzing Mallo et al. the following point should be noted:
Mallo teaches that a specific surfactant is not required (see Col 3, Line 13 -17).
" ...the production of which does not require either the use of

a cosolvent or the synthesis of specific surfactant."
A person skilled in that art would understand this to mean that the choice of surfactant is not critical to the invention.

The table below summarizes the examples of Mallo. These examples indicate that the Hypermer 1083 had no impact on the structure of Mallo's invention and that the

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associative properties claimed are related to the use of the hydrophobic monomer.
Further, the use of MBA is responsible for a significant level of viscosification:

	Ex 1	CE 1	Ex 2	CE 2	Ex 3	CE 3
Monomers	AA	AA	AA	AA	AA	AA
	AM	AM	AM	AM	AM	AM
	Hydrophobic monomer		Hydrophobic monomer		Hydrophobic monomer	
	MBA	MBA	MBA	MBA		
Surfactant	SSO	SSO	H 1083	H 1083	SSO	SSO
Viscosity ~1% in water (mPA.s)	75000	28000	61800	24000	38200	4000

AA = Acrylic Acid
AM = Acrylamide
Hydrophobic monomer = Ethoxlylated triphenethyl benzene methacrylate (See Col 5, Line 20)
MBA = Methylene bisacrylamide
SSO = Sorbitan sesquioleate
H 1083 = Hypermer 1083

Example 1 (Ex 1) is the inventive product of Mallo et al. If the hydrophobic monomer
is removed comparative example (CE 1), the viscosity drops to ~1/3 the level.
Contrast this to example 3 (Ex 3), where removal of the MBA drops the viscosity by
~1/2 to a level that is more similar to CE 1 than Ex 1. This suggests that the
predominant impact on enhanced viscosity is due to the MBA. This is not to say that
the hydrophobic monomer has no effect, because it is clear in Comparative example
3 (CE 3) that removal of the hydrophobic monomer results in a dramatic drop in
viscosity. CE 3 can be considered to be the control material (an uncrosslinked
linear polymer of AA and AM).

One skilled in the art would conclude from this data that the viscosity of 75000
(example 1), compared to the level of 4000 (CE-3) is due to the combination of both
the hydrophobic monomer and MBA. The MBA is creating a much higher molecular
weight material that made without MBA.

Now, consider Ex 2. Sorbitan sesquioleate surfactant (SSO) is replaced by
surfactant H 1083. The result is a significant decrease is viscosity (~20%) relative to
Ex 1. This would suggest to one skilled in the art that the surfactant H 1083 is

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detrimental to, or, at the minimum, has no effect on, the properties of the polymer. This is significantly different that the polymer disclosed in the applicants invention, where the presence of a polymeric surfactant is <u>required</u> to attain the inventive attributes.   This data would teach against the use of the surfactant H-1083.

Removal of the hydrophobic monomer in CE 2 again provides a product that is inferior to CE 1, indicating again that H 1083 is detrimental to, or, at the minimum, has no effect on, the properties of the polymer. This is significantly different that the polymer disclosed in applicants invention, where the presence of a polymeric surfactant is <u>required</u> to attain the inventive attributes.
One skilled in the art would conclude that surfactant H 1083 has no impact on the product and is just added as an alternative surfactant. Again, the inventive material of applicants' invention requires the use of a polymeric surfactant. The use of Sorbitan sesquioleate in the examples of applicants' invention would result in a material similar to CE 3.

In view of these remarks, Applicants respectfully requests that this rejection be withdrawn.

Applicants request an extension of time of three months for this reply. The Commissioner of Patents is hereby authorized to charge deposit account 08-1800 for the extension of time.

It is believed that there are no other additional fees required for entry of this amendment or for maintaining the pendency of this application. If there are any additional fees required to have this amendment entered or to keep the application pending the commissioner is hereby authorized to change the fee to deposit account number 08-1800.
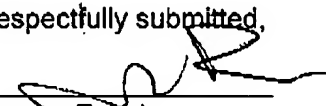
It is submitted that the foregoing reply is completely responsive under 37 CFR 1.111 and that all grounds of rejection and objection have been completely overcome or

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obviated. It is submitted that all claims are now in condition for allowance and a notice of allowance for all pending claims is respectfully requested.

If there are any questions or comments regarding this paper or the present application, Examiner is invited to contact the undersigned at the below listed telephone number

Respectfully submitted,

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PRINCIPLES OF POLYMERIZATION

Third Edition

GEORGE ODIAN
The College of Staten Island
The City University of New York
Staten Island, New York

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1991

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2-13a Types of Copolymers

Further variation is possible in the polymer structure and properties by using mixtures of the appropriate reactants such that the polymer chain can have different R and R' groups. Thus polyamide structures of types **XXXVIII** and **XXXIX** are possible variations on structures

$$-CO-R-CONH-R'-NHCO-R''-CONH-R'''-NH-$$

<div align="center">

XXXVIII

</div>

$$-NH-R-CO-NH-R''-CO-$$

<div align="center">

XXXIX

</div>

XXXVI and **XXXVII**, respectively. A polymer such as **XXXVIII** or **XXXIX** has two different repeat units and is referred to as a *copolymer*; the process by which it is synthesized is referred to as *copolymerization*. Polymers with structures **XXXVI** and **XXXVII**, each containing a single repeat unit, may be referred to as *homopolymers* to distinguish them from copolymers.

Different types of copolymers are possible with regard to sequencing of the two repeating units relative to each other. Thus a copolymer with an overall composition indicated by **XXXVIII** could have the *alternating copolymer* structure shown in **XXXVIII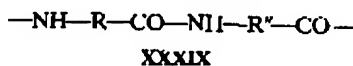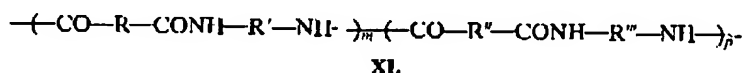** in which the R, R', R'', and R''' groups alternate in that order over and over again along the polymer chain, or the *block copolymer* structure **XL** in which

$$-(-CO-R-CONH-R'-NH-)_m(-CO-R''-CONH-R'''-NH-)_n-$$

<div align="center">

XL.

</div>

blocks of one type of homopolymer structure are attached to blocks of another type of homopolymer structure, or the *statistical copolymer* structure in which there is an irregular (statistical) distribution of R and R'' groups as well as R' and R''' groups along the copolymer chain. Similarly, one can have alternating, block, and statistical copolymers for the overall composition **XXXIX**.

For the statistical copolymer the distribution may follow different statistical laws, such as Bernoullian (zero-order Markov), first- or second-order Markov, depending on the specific reactants and the method of synthesis. This is discussed further in Secs. 6-2 and 6-5. Many statistical copolymers are produced via Bernoullian processes wherein the various groups are randomly distributed along the copolymer chain; such copolymers are *random copolymers*. The terminology used in this book is that recommended by IUPAC [Ring et al., 1985]. However, most literature references use the term *random copolymer* independent of the type of statistical distribution (which seldom is known).

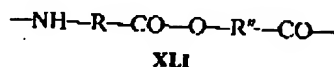The alternating and statistical copolymer structures can be symbolized as

<div align="center">

~~~ABABABABABABABABABABABAB~~~

Alternating copolymer

~~~AABABBBABAABAAABBABBBAAB~~~

Statistical copolymer

</div>

d properties by using mixtures
n can have different R and R'
ind **XXXIX** are possible vari-

ℓ'''—NH—

XXXVIII or **XXXIX** has two
r; the process by which it is
. with structures **XXXVI** and
eferred to as *homopolymers*

rd to sequencing of the two
with an overall composition
olymer structure shown in
nate in that order over and
ymer structure **XL** in which

:ONH—R'''—NH—)$_P$

:d to blocks of another type
ructure in which there is an
: well as R' and R''' groups
lating, block, and statistical

iw different statistical laws,
l-order Markov, depending
is discussed further in Secs.
via Bernoullian processes
; the copolymer chain; such
ed in this book is that rec-
st literature references use
atistical distribution (which

1 be symbolized as

where Λ and B represent two different repeating units. Different block copolymers are distinguished by the number of blocks per molecule, for example,

A_mB_p	$\Lambda_mB_p\Lambda_m$	$A_mB_pA_mB_p$	$(A_mB_p)_n$
Diblock	Triblock	Tetrablock	Multiblock

which are referred to as AB diblock, ABA triblock, ABAB tetrablock, and AB multiblock copolymers, respectively. For the various block copolymers the values of m and p as well as n are average values; thus, there is a distribution of block lengths and number of blocks along the copolymer chain. There is considerable structural versatility possible for statistical and block copolymers in terms of the relative amounts of A and B in a copolymer. For block copolymers there is the additional variation possible in the number of blocks of A and B and their block lengths (values of m and p).

Alternating, statistical, and random copolymers are named by following the prefix "poly" with the names of the two repeating units. The specific type of copolymer is noted by inserting -*alt*-, -*stat*-, or -*ran*- in between the names of the two repeating units; -*co*- is used when the type of copolymer is not specified, i.e., poly(A-*co*-B), poly(A-*alt*-B), poly(A-*stat*-B), poly(A-*ran*-B). Block copolymers are named by inserting -*block*- in between the names of the homopolymers corresponding to each of the blocks. The di-, tri-, tetra-, and multiblock copolymers are named as polyA-*block*-polyB, polyA-*block*-polyB-*block*-polyA, polyA-*block*-polyB-*block*-polyA-*block*-polyB, and poly(polyA-*block*-polyB), respectively. Adoption in the literature of some of these IUPAC recommendations for naming copolymers has been slow.

~~~AAAAAΛΛΛΛAAAAAAAAAAAAAAAAAAAAAA~~~
|
B
B
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}

Graft copolymer

Λ fourth type of copolymer is the *graft copolymer* in which one or more blocks of homopolymer B are grafted as branches onto a main chain of homopolymer A. Graft copolymers are named by inserting -*graft*- in between the names of the corresponding homopolymers with the main chain being named first (e.g., polyA-*graft*-polyB). Graft copolymers are relatively unimportant for step polymerizations because of difficulties in synthesis. Graft copolymers are considered further in Sec. 9-8.

The discussion to this point has involved copolymers in which both repeating units have the same functional group. A second category of copolymer involves different

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functional groups in the two repeat units, for example, an amide–ester copolymer such as
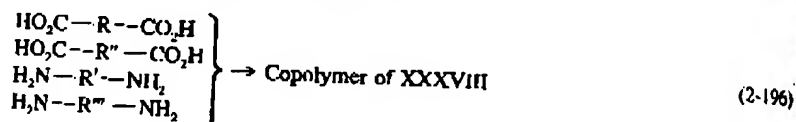
$$-NH-R-CO-O-R''-CO-$$

XLI

instead of the amide–amide copolymer **XXXIX**. Both categories of copolymers are important, although not in the same manner.

2-13b Methods of Synthesizing Copolymers

2-13b-1 Statistical Copolymers

The copolymerization of a mixture of monomers offers a route to statistical copolymers; for instance, a copolymer of overall composition **XXXVIII** is synthesized by copolymerizing a mixture of the four monomers

$$\left.\begin{array}{l} HO_2C-R--CO_2H \\ HO_2C--R''-CO_2H \\ H_2N-R'--NH_2 \\ H_2N--R'''-NH_2 \end{array}\right\} \rightarrow \text{Copolymer of XXXVIII}$$

(2-196)

It is highly unlikely that the reactivities of the various monomers would be such as to yield either block or alternating copolymers. The quantitative dependence of copolymer composition on monomer reactivities has been described [Korshak et al., 1976; Mackey et al., 1978; Russell et al., 1981]. The treatment is the same as that described in Chap. 6 for chain copolymerization (Secs. 6-2 and 6-5). The overall composition of the copolymer obtained in a step polymerization will almost always be the same as the composition of the monomer mixture since these reactions are carried out to essentially 100% conversion (a necessity for obtaining high-molecular-weight polymer). Further, for step copolymerizations of monomer mixtures such as in Eq. 2-196 one often observes the formation of random copolymers. This occurs either because there are no differences in the reactivities of the various monomers or the polymerization proceeds under reaction conditions where there is extensive interchange (Sec. 2-7c). The use of only one diacid or one diamine would produce a variation on the copolymer structure with either $R = R''$ or $R' = R'''$ [Jackson and Morris, 1988].

Statistical copolymers containing repeating units each with a different functional group can be obtained using appropriate mixtures of monomers. For example, a polyesteramide can be synthesized from a ternary mixture of a diol, diamine, and diacid or a binary mixture of a diacid and amine-alcohol [East et al., 1989].

2-13b-2 Alternating Copolymers

The alternating copolymer of composition **XXXVIII** cannot be synthesized. However, it is possible to synthesize an alternating copolymer in which $R'' = R$ by using a two-stage process. In the first stage a diamine is reacted with an excess of diacid to form a trimer

$$2nHO_2C--R-CO_2H + nH_2N-R'-NH_2 \rightarrow$$

$$nHO_2C-R-CONH-R'-NHCO-R-CO_2H$$

(2-197)